

# EMISSION DEVICE, ESPECIALLY FOR MOBILE TELEPHONY, AND USE OF ONE SUCH EMISSION DEVICE

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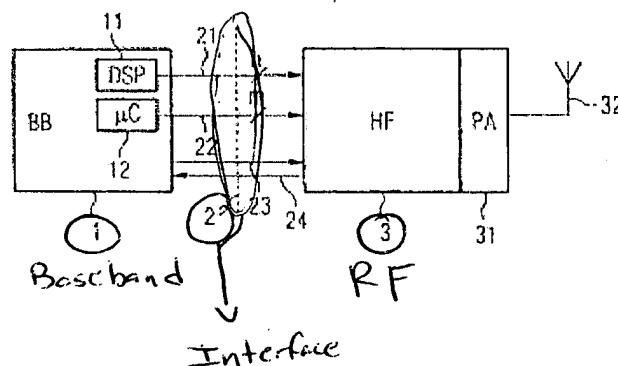
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## Abstract of WO02091601

The invention relates to an emission device comprising a base strip module (1) and a high frequency module (3), which is especially designed for emission in mobile telephony. An interface (2) having an exclusively digital structure is provided between the base strip module (1) and the high frequency module (3), said interface preferably ensuring completely separate transmission of useful data (21) and configuration data (22). The principle described enables an entirely digital structure of the base strip module (1) in addition to high flexibility, due to the combination of a single base strip module (1) and a plurality of different high frequency modules (3).



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Description transmission arrangement, in particular for the portable radio, as well as use of a transmission arrangement the present invention concerns a transmission arrangement, in particular for the portable radio, as well as the use of a transmission arrangement.

With respect to the portable radio one differentiates usually between mobile stations and < RTI ID=1.1> Stations permanently installed, < /RTI> whereby several mobile stations simultaneous with Fest-oder basis station to communicate can.

According to standardized modulation procedures, like GSM (global system for mobile Communication), EDGE, TIA-EIA136, UTRA FDD (UMTS, universal mobile Telecommunication standard), UTRA TDD, IS-95 and so on, is < in; RTI ID=1.2> Sendeeinrichtungen< /RTI> from mobile stations by means of modulators in accordance with carrier frequency too < RTI ID=1.3> übertragender< /RTI> Data, like speak or text datas, < RTI ID=1.4> modu < /RTI> < RTI ID=1.5> liert.< /RTI> Usually such modulators cover several functional units, for example a baseband part and a high frequency part. In the baseband part by means of digital signal processing from the data which can be transmitted a standard-conformal, usually komplexwertiges signal is produced. This komplexwertige signal is shifted in the high frequency part into a high frequency situation, < for example in a homodyn or; RTI ID=1.6> heterodyn< /RTI> Transmission architecture, and as reellwertiges signal after a suitable < RTI ID=1.7> Leistungsverstärkung< /RTI> for example by means of an antenna over a radio link sent.

Due to different physical requirements at Basisband-und the high frequency part these functional units are usually realized in from each other separated integrated circuits (chips) with different production processes. A suitable interface is to be planned between baseband part and high frequency part, which is designed as analog signal interface usually at present. The baseband signals are normally made available, divided thereby at this interface as komplexwertige baseband signals into real part and an imaginary part, when so-called IQ-signal with a Inphase component and one < for this; RTI ID=2.1> 90 < /RTI> out of phase quadrature component. I-and Q-component thereby as difference signal are transferred mostly in each case, so that again two wires each are to be planned. Beside therefore necessary large number of wires at the interface and therefore a high number of pins of the integrated circuits involved, this well-known signal delivery requires both on Hochfrequenz-als also on the baseband side qualitatively high-quality, analog signal processing components, as for example digital one/analog converter and amplifier.

Further usually special signal processing steps must be made regarding the high frequency part, in order to compensate or correct inadequacies, Nichtidealitäten or tolerances in the high frequency part ahead ahead in the baseband circuit part. Therefore are < a view, an analysis and a development; RTI ID=2.2> Basisbandteils< /RTI> independently of the high frequency part no longer possible. Due to the progressive development on the field of the digital signal processing and < RTI ID=2.3> Modulatorkonzepte< /RTI> the portion of the processing in the baseband in relation to entirely the signal processing path rises ever more, particular regarding cooperating with the high frequency part. Thereby an unwanted, reduced flexibility is given to particular by baseband components and/or baseband chips, since the baseband top components are only together with that high frequency building group applicable, for which it was developed.

It is therefore task of the present invention, a transmission arrangement, in particular for the portable radio, as well as to indicate whom the dung of a such transmission arrangement, which is realizable a high flexibility, i.e. by the high frequency part independent baseband processing made possible as well as with small expenditure, in particular small pin number.

According to invention the task with a transmission arrangement, in particular for the portable radio, is solved, exhibiting - a baseband construction unit to processing of a baseband signal with to the digital data communication a trained Input/output and - a high frequency construction unit for the shifting of the baseband signal into a high frequency signal, with an input/output trained as digl the taken data communication, which can be sent, which is coupled by means of an interface with the input/output of the baseband construction unit to the digital over carrying of utilizable data which can be sent and from configuration data to configuring the high frequency construction unit.

When utilizable data which can be sent are thereby those data understood, with which in the high frequency part a carrier frequency is modulated and sent for example over an antenna.

As configuration data those data are understood, with which the high frequency construction unit is configurable, for example < RTI ID=3.1> Modulationsart< /RTI> in the transmitter, amplitude, transmitting power process, transmitter frequency, point of transmitting time, transmission duration, kind of transmit mode, Ein-und switching off behavior of the transmitter, so-called power the Ramping, and so on.

The described, digital interface between baseband construction unit and high frequency construction unit offers favourable-proves a baseband processing independent of the high frequency part. In the baseband construction unit no analog circuit components in the transmission signal path are necessary, so that a high device complexity and in

high frequency unit (i.e. RF) coupled to  
Baseband by interface. Thus physically  
separate modules. (see figure on cover)  
& abstract

particular a large independence from manufacturing dispersions can be ensured. Without an analog interface between Basisband- und high frequency part can be completely done. Over the described, digital interface both modulation data know (utilizable data) and configuration data by the baseband and the high frequency part to be transferred. Further the described, digital interface can get along with a small number of wires as well as with low data rates.

In the baseband construction unit signal processing steps on information bit level can be accomplished, for example the formation of < RTI ID=4.1> Transportation blocks, < /RTI> Error protection coding, adaptation of the bit rate, channel encoding as for example Faltungs- und/or turbo-coding, nesting (Interleaving), transportation current multiplex formation, Rahmen- und package segmenting and so on. Those signal processing steps on physical level, which < the coating 1 in; RTI ID=4.2> OSI coating < /RTI> correspond to model, as for example pulse shaping, modulation, Vorkorrektur and compensation, can be implemented with the described, digital interface completely in the high frequency construction unit and therefore independently of the baseband construction unit.

Altogether the described transmission arrangement is suitable for the inset in portable radio act ions and there for the support of the portable radio standards GSM, EDGE, TIA/EIA136, in addition, portable radio standard of the third generation such as UTRA FDD, UTRA TDD or IS-95, particularly.

Excluding digital developed interface a clearly simplified circuit layout and circuit Design in Basisband- und permits the high frequency component. Besides a clearly higher flexibility arises as a result of the fact that those digital signal processing steps can be accomplished to the compensation and/or Vorkorrektur of the high frequency signals directly in the high frequency building group, i.e. in the high frequency construction unit, so that a baseband component can be coupled depending upon application with different high frequency components.

Excluding digital realization of the baseband component makes possible the inset of economical Herstell< RTI ID=5.1> lungsprozessen < /RTI> at small expenditure, since no analog circuit components must be integrated. In addition an adaptation to future manufacturing processes with higher integration densities at very small expenditure is possible.

The baseband construction unit and the high frequency construction unit can be from each other separated, integrated: circuit devices (chips).

In a favourable further training of the present invention a first multi-leader connection to the transmission of the utilizable data is intended, which < on the one hand with; RTI ID=5.2> a /Ausgang < /RTI> the baseband construction unit and is on the other hand with the input/output of the high frequency construction unit connected, and with which a second multi-leader connection to the transmission of configuration data is intended, which is on the other hand with the input/output of the high frequency construction unit connected on the one hand with the input/output of the baseband construction unit and.

The separate data communication of Nutz- und < RTI ID=5.3> configuration < /RTI> data over the first and second multi-leader connection simplifies and decartelizes the structure of the signal processing in the baseband component, since the useful information by a digital signal processor in the baseband component and the configuration information from a micro CONTROLLER in the baseband component are usually made available independently and with available arrangement also independently over the digital interface will transfer.

The utilizable data cover like already described mainly the modulation data for the high frequency component for the modulation of a carrier frequency, while configuration data cover information for configuring the high frequency construction unit, for example transmitter frequency, transmission amplitude, transmitting power and other transmission parameters.

The separate, digital transmission effected from utilizable data and configuration data favourable-proves with telegram-oriented or package-oriented transmission protocols.

For first and second multi-leader connection both in the baseband construction unit as well as in the high frequency construction unit separate in each case, independently planned in/exits can be formed.

For example the baseband component can do first < RTI ID=6.1> a /Ausgang < /RTI> have, which is coupled with the digital signal processor for the transmission of the utilizable data, while to < RTI ID=6.2> Übertra < /RTI> gung configuration data a second input/output at the baseband construction unit to be intended can, which is coupled with the micro CONTROLLER in the baseband construction unit.

The high frequency construction unit prefers a modulator, one enclosure < RTI ID=6.3> Digital one/analogWandler < /RTI> as well as frequency converters for the conversion of a signal from the baseband to a high frequency signal. Besides an achievement amplifier can be intended, which is coupled with an antenna at its exit.

In a further, favourable embodiment of the present invention the first digital covers < RTI ID=6.4> Mehrleiterverein < /RTI> dung - a data line laid out to the serial data communication, - a bit timing line for the transmission of a clock pulse, whereby one elementary period each is assigned to one per bits of the data line which can be transferred and - a word clocking line to indicators of the beginning of transmission of a consequence of bits on the data line.

Over the data line to transferring data can be organized in transmission units, so-called telegrams, which for example in each case serially arranged 16 bits to cover. A transmission pulse (brush) of the transmission circuit as derum can cover for example with GSM a consequence of altogether 11 telegrams with 16 bits each length.

Due to the relatively small data sets which can be transferred favourably serial digital transmission methods can, in particular with standardized transmission protocols or modified transmission protocols as < RTI ID=7.1> I2S < /RTI> or < RTI ID=7.2> I2c < /RTI> are used.

In a further, preferential embodiment of the present invention the second digital multi-leader connection covers a data line laid out to the serial data communication of configuration data, a bit timing line for the transmission of a clock pulse, whereby one elementary period each is assigned to one per bits of the data line which can be transferred and a selection line for activating the high frequency part or a partial circuit in the high frequency construction unit.

Also configuration data can be transmitted over, a second digital multi-leader connection trained as 3-Leiter interface, whereby the transmission protocol is organized preferentially in telegrams. It can concern single telegrams or a group out of directly successive telegrams. Since with available subject-matter the utilizable data communication can take place completely independently from the configuration data transmission, it is < RTI ID=7.3> ermöglicht, dass beispielsweise ein Mikrocontroller im Basisbandbaustein zu von ihm selbst bestimmten Zeitpunkten Sendeparameter an die Hochfrequenzbaugruppe überträgt, ohne dass der digitale Signalprozessor im Basisbandbaustein dadurch beeinflusst ist oder gar eine < RTI ID=7.4> Nutzdatenübertragungs-oder</RTI> Interrupt would be necessary. Thereby the temporal operational sequence is < and; RTI ID=7.5> Koordinierung</RTI> the same in the baseband construction unit substantially simplifies.

Configuration data determine for example the type of modulation, as for example GMSK or QAM, the amplitude, the transmitting power process, the transmitter frequency, the point of transmitting time, the transmission duration, the transmitter mode of operation, Ein-und switching off behavior of the transmitter et cetera.

In a further, preferential execution of the present invention a synchronisation line is intended for synchronizing the utilizable data in the high frequency part, which is on the one hand with the input/output of the high frequency construction unit connected on the one hand with the input/output of the baseband part and.

With the synchronisation line synchronisation data can be transmitted, those the time of the respective transmission beginning of and end at the output at the high frequency construction unit, i.e. on a high frequency carrier level, for example when sending in time slots, so-called Bursts specifies.

In a further, preferential embodiment of the present invention Ein-und of exits of Hochfrequenzund baseband construction unit is appropriate for a serial data communication. A serial data communication, in the available case a serial digital data communication, the inset of digital transmission methods with standardized transmission protocols, as for example < made possible favourably; RTI ID=8.1> I 2 S</RTI> or < RTI ID=8.2> I 2c</RTI> due to the available, small data sets which can be transferred.

In a further, to preferential embodiment of the present invention in/exits of Basisband-und high frequency part for a university-managemental data communication of to baseband-to the high frequency part, did not turn around, laid out. Thereby a clear reduction of the expenditure is obtained for the realization of the described digital interface.

In a further, preferential embodiment of the present invention a digital is < RTI ID=8.3> interrupt request </RTI> line between baseband construction unit and high frequency construction unit attached, for arranging the resumption of the data transmission of the baseband construction unit arranges by the high frequency construction unit.

In a further, preferential embodiment of the present invention high frequency construction unit an additional control line is intended for the control of an achievement amplifier to the reinforcing of the high frequency signal between Basisband-und. The achievement amplifier, English power Amplifier, can be for example at the output in the high frequency construction unit intended and couple for example a frequency converter of the baseband into a high frequency situation with an antenna. For heading for the achievement amplifier, in particular of its Ein-und switching off behavior, English power Ramping, an analog can be preferential in relation to a digital control of the achievement amplifier and mean a smaller technical circuiting expenditure depending upon application.

Further details of the invention are subject-matter of the Unteransprüche.

The invention is more near described in the following at an embodiment on the basis the designs.

Show: Figure 1 a first embodiment of the available it identification on the basis a simplified block-switch picture, figure of 2 exemplary signal processes of the 3-Leiter

Connection for the transmission of the utilizable data over those

Interface of figure 1, figure of 3 exemplary signal processes of the Konfigurationsda 1 and figure 4 ten on the basis the signal processes the connection between the transmission of configuration data, utilizable data and synchronisation data as well as in principle for transmission over the interface of Fi gur

Process of the transmitting power over the interface in accordance with figure 1.

Figure < RTI ID=10.1> I</RTI> one shows < RTI ID=10.2> Sendeschaltung</RTI> with a baseband construction unit 1 and to it over an interface 2 attached high frequency construction unit 3. The baseband construction unit 1 serves 11 for the digital processing sending utilizable data and covers a digital signal processor for the processing of the utilizable data as well as a micro CONTROLLER 12 to the control < RTI ID=10.3> Hochfre </RTI> quenzbauteils by means of configuration data as well as altogether for flow control.

The high frequency construction unit 3 covers an achievement amplifier 31, which can be planned separately into alternative embodiments also as external part from the high frequency component 3 in the available embodiment. At the output at the achievement amplifier 31 an antenna is attached over an antenna line 32, which modulated signals high frequency for transmission is laid out.

The interface 2 between baseband construction unit 1 and high frequency construction unit 3 covers a first multi-leader connection 21, laid out for the transmission of the utilizable data, which < from the digital signal processor; RTI ID=10.4> 11</RTI> made available, a second digital multi-leader connection 22, laid out for the transmission from configuration data to the control of the high frequency construction unit 3 and coupled with the micro CONTROLLER 12 is in the baseband construction unit < RTI ID=10.5> 1, </RTI> a synchronisation line 23 for the establishment of the beginning and end put by transmitting time slots in the Sendesignal 32, as well as an interrupt request line 24, a so-called inter rupt wire, by means of those the high frequency component 3 into the position is to be arranged, the baseband component 1 to a new action, in particular for the recent transmission of data.

While the two multi-leader connections 21.22 as well as the synchronisation line 22 are laid out as unidirectional data lines in the available embodiment, i.e. to the transmission only toward of the baseband construction unit 1 to the high frequency construction unit 3, is the interrupt request line 24 for transmission in a reverse Si< RTI ID=11.1>



frequency data over an antenna sends.

The address determines then the destination, for example a functional module, to which the data will transfer 3 in the high frequency component are.

As on the basis the figures 2 and 3 in the synopsis with figure 1 becomes clear, the micro CONTROLLER can 12 too times specified by him independently of one < RTI ID=14.2> Nutzda < /RTI> tenübertragung transmission parameters to the high frequency component 3 transfer, without thereby the digital < RTI ID=14.3> Signalprozes < /RTI> sor 11 to be affected or its processing or transmission of utilizable data be interrupted it must whereby altogether a substantial simplification of the temporal operational sequence and the flow control in the baseband component 1 results.

Over the second multi-leader connection 22 configuration data are transmitted as for example type of modulation, amplitude, transmitting power process, transmitter frequency, point of transmitting time, transmission duration, transmitter mode of operation, Ein-und switching off behavior of the transmitter et cetera.

For the transmission of a telegram group a particular configuration telegram can be used, which specifies the beginning, the length and the starting destination address of the group before beginning of the telegram group. A telegram group serves for example to stop the basic configuration of the transmitter time-efficiently.

During the transmission of single telegrams the time of the telegram transmission determines usually also the time of the taking effect of the new adjustment.

Optionally also data can be transmitted from the high frequency part to the baseband part by implementation of an additional feeder line, is not represented to which in figure 3, which were requested before over a particular requirement telegram by the baseband part. This requirement telegram can be for example by the fact characterized that a bit in the address part serves for the indicator that in the address not writing, but reading is to be accessed.

Figure 4 finally illustrates the connection between the transmission of utilizable data, configuration data and synchronisation data as well as the process in principle of the transmitting power of a GSM conformal Sendesignals 32 of figure < RTI ID=15.1> I.< /RTI> The utilizable data become thereby over the first multi-leader connection 21, which configuration data transfer over the second digital multi-leader connection 22 and the synchronisation data over the synchronisation line 23 in accordance with figure 1.

First it is guaranteed that all configuration data necessary for sending the high frequency construction unit over an antenna became to transfer 22 to the high frequency building group 3 over the second digital multi-leader connection and also sufficiently many modulation bits over the first digital multi-leader connection 21 into an entrance buffer of the high frequency building group 3 were written. Over the synchronisation line 3 afterwards a starting signal can be given to the modulator in the high frequency construction unit 3, in order to begin with the modulation and sending. For example a rising flank marks one < RTI ID=16.1> Sendebeginn< /RTI> and a sloping flank an end of a transmitting time slot (brush).

Altogether those designate time t1 to t8 the following, significant times of the synchronisation of the transmitter: t1 beginning of the transmission of configuration information, t2 beginning of the transmission of useful information, T3 end of the transmission of configuration information, t4 start of the modulator, t5 beginning of the upward output ramp, t6 end of the transmission of useful information, < RTI ID=16.2> t7< /RTI> Introduce Sendeimpulsendes, t8 end of the downward output ramp.

Reference symbol list 1 baseband construction unit 2 interface 3 high frequency construction unit 11 digital signal processor 12 micro CONTROLLERS 21 multi-leader connection 22 multi-leader connection 23 synchronisation line 24 < RTI ID=17.1> Unterbrechungsanforderungsleitung< /RTI> CLO bit timing < RTI ID=17.2> WAO< /RTI> Word clock TX data < RTI ID=17.3> endiv< /RTI> Selection line clkser bit timing DATA out data MSB must significant bit LSB leases significant bits